

# Staging Laparoscopy in Patients With Extrahepatic Biliary Carcinoma

## Analysis of 100 Patients

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### Objective

To evaluate the benefit of staging laparoscopy in patients with gallbladder cancer and hilar cholangiocarcinoma.

### Summary Background Data

In patients with extrahepatic biliary carcinoma, unresectable disease is often found at the time of exploration despite extensive preoperative evaluation, thus resulting in unnecessary laparotomy.

### Methods

From October 1997 to May 2001, 100 patients with potentially resectable gallbladder cancer ( $n = 44$ ) and hilar cholangiocarcinoma ( $n = 56$ ) were prospectively evaluated. All patients underwent staging laparoscopy followed by laparotomy if the tumor appeared resectable. Surgical findings, resectability rate, length of stay, and operative time were analyzed.

### Results

Patients underwent multiple preoperative imaging tests, including computed tomography scan, ultrasound, magnetic resonance cholangiopancreatography, and direct cholangiography. Laparoscopy identified unresectable disease in 35 of 100 patients. In the 65 patients undergoing open exploration, 34 were found to have unresectable disease. Therefore, the overall accuracy for detecting unresectable disease was 51%.

There was no difference in the accuracy of laparoscopy between patients with gallbladder cancer and hilar cholangiocarcinoma. Laparoscopy detected the majority of patients with peritoneal or liver metastases but failed to detect all locally advanced tumors. In patients undergoing biopsy only, laparoscopic identification of unresectable disease significantly reduced operative time and length of stay compared with patients undergoing laparotomy.

The yield of laparoscopy was 48% in patients with gallbladder cancer (56% in those who did not undergo previous cholecystectomy), but only 25% in patients with hilar cholangiocarcinoma. However, in patients with locally advanced but potentially resectable hilar cholangiocarcinoma, the yield of laparoscopy was greater, 36% (12/33, T2/T3 tumors) versus 9% (2/23, T1 tumors).

### Conclusions

Laparoscopy identifies the majority of patients with unresectable hilar cholangiocarcinoma or gallbladder carcinoma, thereby reducing both the incidence of unnecessary laparotomy and the length of stay. The yield of laparoscopy is lower for hilar cholangiocarcinoma but can be improved by targeting patients at higher risk of occult unresectable disease. All patients with potentially resectable primary gallbladder cancer and patients with T2/T3 hilar cholangiocarcinoma should undergo staging laparoscopy before surgical exploration.

Resection remains the most effective therapy for patients with extrahepatic biliary cancer. However, because many patients present late in the course of the disease, resection is

often not possible. This fact is reflected in the National Cancer Institute Surveillance, Epidemiology, and End Results (SEER) data, which evaluated nearly 1,900 patients with extrahepatic bile duct tumors from 1978 to 1986.<sup>1</sup> Of these, only 28% presented with localized (potentially resectable) disease, whereas regional and distant metastases were present in 46% and 26% of patients, respectively.

A variety of preoperative imaging modalities, including computed tomographic (CT) scanning, ultrasound, percuta-

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neous transhepatic cholangiography, angiography, and magnetic resonance cholangiopancreatography (MRCP), have been used to assess patients with hilar cholangiocarcinoma and gallbladder cancer. However, even after extensive preoperative imaging, many patients are found to have either unresectable, locally advanced tumors or metastatic disease at laparotomy. After thorough preoperative imaging, only 50% to 75% of patients who undergo exploration are amenable to a potentially curative resection.<sup>2-6</sup>

Because of the high incidence of occult unresectable disease, staging laparoscopy has been used increasingly in patients with hepatic malignancies. In patients with primary and secondary hepatic malignancies, laparoscopy correctly identifies the majority of patients with unresectable disease,<sup>7,8</sup> thereby decreasing length of stay and overall hospital charges.<sup>8</sup> However, few contemporary studies have evaluated the use of laparoscopy specifically in patients with hilar cholangiocarcinoma or gallbladder cancer. Because the yield of laparoscopy is dependent on the quality of preoperative imaging, it is particularly important to assess this procedure in patients evaluated with contemporary radiographic studies. The present study examines the benefit of staging laparoscopy in patients with hilar cholangiocarcinoma and gallbladder cancer, accrued over a relatively short period and undergoing thorough preoperative investigation.

## METHODS

Since 1997, all patients with primary or secondary hepatic malignancies undergoing staging laparoscopy at Memorial Sloan-Kettering Cancer Center (MSKCC) have been evaluated prospectively. From this prospective database, we identified 100 patients with potentially resectable disease with hilar cholangiocarcinoma or gallbladder cancer consecutively evaluated with staging laparoscopy. All patients had pre-, intra-, or postoperative histologic confirmation of carcinoma. Preoperative imaging was extensive and included imaging obtained at referring hospitals and at MSKCC. Cases were reviewed at a multidisciplinary hepatobiliary case management conference and, on the basis of preoperative imaging, only patients considered to have potentially resectable disease were included in this study. No patient with clear evidence of unresectable disease was included. Patients with potentially resectable hilar cholangiocarcinoma were staged according to a recently reported preoperative T staging system (Table 1).<sup>6</sup> This staging system, which is based on radiographic assessment of factors related to local tumor extent, has been shown to correlate with resectability and the incidence of metastatic disease.

Laparoscopy was performed through upper abdominal port sites in the line of the planned incision just before open exploration, as previously described.<sup>7,8</sup> Laparoscopic ultrasound was performed in selected patients using an Aloka Ultrasound Imaging System with a 7.5-MHz flexible laparoscopic probe (Tokyo, Japan). A complete laparoscopic

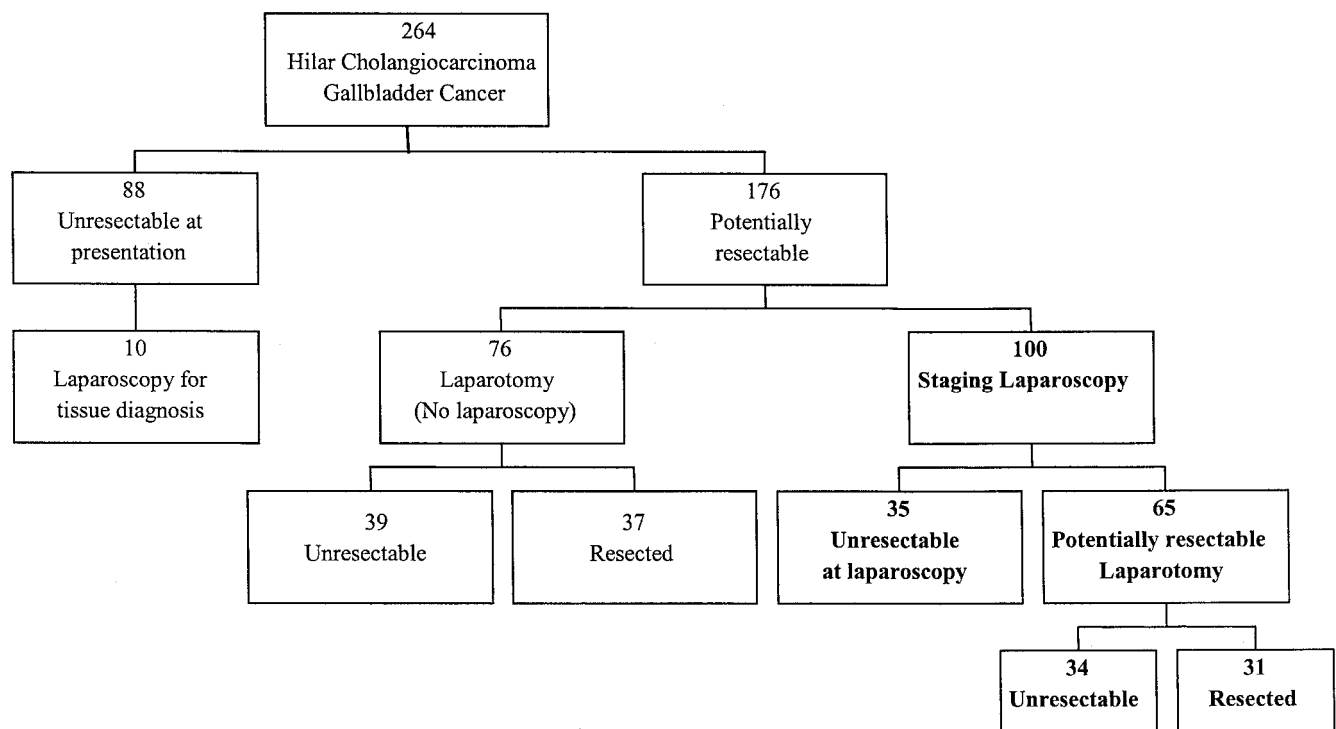
**Table 1. REVISED PREOPERATIVE T STAGING SYSTEM FOR PATIENTS WITH HILAR CHOLANGIOCARCINOMA**

T Stage	Description
1	Tumor involving biliary confluence +/- unilateral extension to 2° biliary radicles No liver atrophy or portal vein involvement
2	Tumor involving biliary confluence +/- unilateral extension to 2° biliary radicles with ipsilateral portal vein involvement +/- ipsilateral hepatic lobar atrophy No main portal vein involvement
3	Tumor involving biliary confluence + bilateral extension to 2° biliary radicles; OR unilateral extension to 2° biliary radicles with contralateral portal vein involvement; OR unilateral extension to 2° biliary radicles with contralateral hepatic lobar atrophy; OR main or bilateral portal venous involvement

examination of the peritoneal cavity included inspection of the liver, gastrohepatic ligament, porta hepatis, pelvis, and peritoneal cavity. Laparoscopic ultrasound was used to assess the liver for evidence of metastatic disease and also to evaluate tumor extent within the porta hepatis. Laparoscopy was considered a failure if none of these relevant areas could be visualized. Biopsy samples were taken from suspicious extrahepatic or hepatic lesions and evaluated with frozen-section histology. Patients who appeared to have resectable disease at laparoscopy underwent a full laparotomy, including mobilization, palpation, and ultrasonography of the liver. In 93 of the 100 patients, staging laparoscopy was performed with planned immediate conversion to laparotomy if there was no evidence of unresectable disease. Alternatively, in 7 of the 100 patients, staging laparoscopy was performed as a separate procedure, and patients with potentially resectable disease were returned to the operating room for laparotomy at a later date.

Tumors were considered unresectable if any of the following conditions were present before surgery or at laparoscopy or laparotomy: peritoneal metastases; discontinuous intrahepatic metastases; involved lymph nodes in the periduodenal, retropancreatic, common hepatic, or celiac nodal basin; locally advanced disease secondary to main portal vein encasement or tumor extension to second-order biliary radicles bilaterally; or unilateral tumor extension to secondary biliary radicles with contralateral lobar atrophy or contralateral portal vein involvement.<sup>3,6</sup> The presence of involved proximal porta hepatis lymph nodes was not a contraindication to resection. In addition, selected patients undergoing exploration with involvement of the portal vein underwent hepatectomy with resection of the portal vein.

The majority of patients presented with jaundice or pruritus. In patients with unresectable disease discovered at laparoscopy, percutaneously placed biliary drainage catheters were the primary means of palliation; these catheters



**Figure 1.** Patients with hilar cholangiocarcinoma and gallbladder cancer evaluated at Memorial Sloan-Kettering Cancer Center from October 1997 to May 2001.

were often replaced with internal metallic stents after surgery. In patients found to have unresectable disease at laparotomy, biliary bypass was performed in selected patients.

Patient demographics, number and type of preoperative imaging tests, extent of laparoscopic examination, surgical findings, procedures performed, resectability, survival, length of stay, and operative time were analyzed. The yield of laparoscopy was calculated using the number of patients with findings of unresectable disease at laparoscopy divided by all patients undergoing laparoscopy. The accuracy of laparoscopy was calculated using the number of patients with findings of unresectable disease at laparoscopy divided by all patients with unresectable disease. Statistical analyses were performed using SPSS for Windows, Version 10.0 (SPSS, Chicago, IL). Continuous variables were compared using the Student *t* test, and categorical variables were compared using a chi-square test. Survival was compared using log-rank analysis.  $P \leq 0.05$  was considered statistically significant.

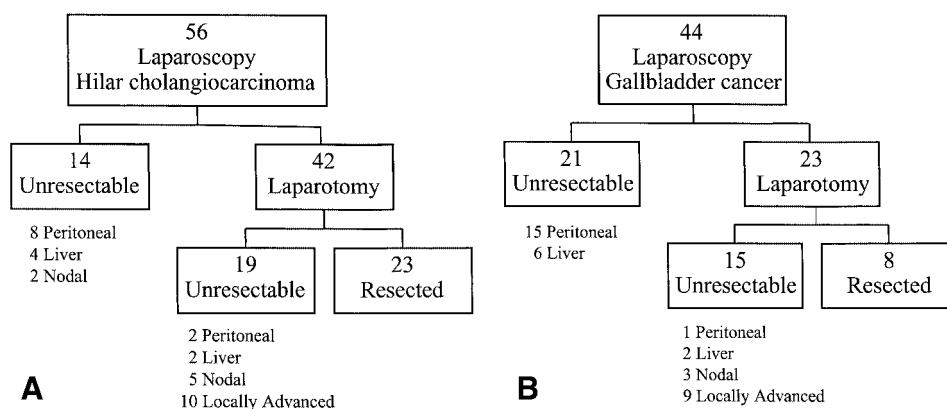
## RESULTS

From October 1997 to May 2001, 137 patients with hilar cholangiocarcinoma and 127 patients with gallbladder cancer were evaluated at MSKCC (Fig. 1). Of this total, 176 patients underwent exploration for attempted resection. Ten patients with hilar cholangiocarcinoma had clear evidence of unresectable disease but required laparoscopy for tissue

diagnosis. These patients were excluded. Selected patients ( $n = 76$ ) underwent laparotomy without laparoscopy based on the surgeon's preference. A total of 100 patients (56 with hilar cholangiocarcinoma, 44 with gallbladder cancer) with potentially resectable tumors based on preoperative imaging were consecutively submitted to staging laparoscopy followed by laparotomy if the tumor appeared resectable; they form the basis for this study. Of the patients with gallbladder cancer, 10 had had a prior cholecystectomy and were referred for re-resection, whereas 34 patients had had no prior resection. Laparoscopic ultrasound was performed in 23 patients. If there was no evidence of extrahepatic disease or intrahepatic metastases at laparoscopy, patients underwent exploratory laparotomy with the intention of performing a complete resection.

## Patient Demographics and Preoperative Imaging

The median age was 67 years (range 42–86). There were 49 men and 51 women. Thirty-seven patients had had a prior laparotomy. Patients underwent multiple preoperative imaging tests, performed either at the referring hospital or at MSKCC. Imaging included contrast-enhanced CT scan (95%), duplex ultrasound (86%), MRI (with or without MRCP) (81%), and direct cholangiography (77%). In most patients, additional studies obtained after referral to MSKCC consisted of duplex ultrasound and MRCP. More than two imaging tests were performed in 85% of patients.



**Figure 2.** Patients with hilar cholangiocarcinoma (A) and gallbladder cancer (B) evaluated with staging laparoscopy.

## Surgical Findings and Procedures

Laparoscopic evaluation was successful in all but three patients, in whom laparoscopy was limited by extensive intraabdominal adhesions. The number of patients found to have unresectable disease at laparoscopy and laparotomy is shown in Figure 2. The surgical findings precluding resection are shown in Table 2. Laparoscopy detected the majority (83% [33/40]) of patients with peritoneal or liver metastases but failed to detect all locally advanced tumors (0/19) and most nodal metastases (2/10,  $P < .0001$ ). Although laparoscopic ultrasound was performed in 23 patients, no patient was found to have unresectable disease based strictly on laparoscopic ultrasound findings. The yield and accuracy of laparoscopy for all patients and for those with hilar cholangiocarcinoma or gallbladder cancer are shown in Table 3. The overall yield of laparoscopy was 35% (35/100). Laparoscopy correctly identified 35 of 69 patients with unresectable disease (accuracy, 51%).

All patients with unresectable disease discovered at laparoscopy underwent biopsy only; no patient underwent a palliative surgical procedure. In patients with unresectable disease found at laparotomy, biliary bypass was performed in 16 of 34 patients. Fifteen of these patients had unresectable locally advanced tumors or nodal disease. Only one

patient with liver metastases underwent biliary bypass. One additional patient underwent prophylactic gastrojejunostomy because of a large gallbladder cancer with duodenal invasion. In the remaining 17 patients with unresectable disease at laparotomy, only diagnostic biopsy was performed.

## Operating Time and Hospital Stay

In patients with unresectable disease undergoing biopsy only, the operative time for patients undergoing laparoscopy alone versus patients undergoing laparotomy was compared. Mean operative time for laparoscopy was  $64 \pm 28$  minutes. Mean operative time for laparotomy alone (excluding laparoscopy time) was  $90 \pm 39$  minutes ( $P = .02$ , Student  $t$  test). Laparoscopic identification of unresectable disease also significantly reduced the length of stay ( $3 \pm 3$  days vs.  $8 \pm 5$  days,  $P < .0001$ , Student  $t$  test) compared with patients with unresectable disease undergoing biopsy only who underwent laparotomy. Patients requiring internalization of biliary catheters generally remained in the hospital after surgery to expedite this procedure, and this additional time is included in the total time for length of stay.

Operative time for laparoscopy in patients undergoing resection compared with patients with unresectable disease

**Table 2. SURGICAL FINDINGS PRECLUDING RESECTION**

	n	Peritoneal Metastases	Liver Metastases	Nodal Metastases	Locally Advanced Tumors
All unresectable patients*	69				
Identified at laparoscopy	35	23	10	2	0
Identified at laparotomy	34	3	4	8	19
Unresectable, hilar cholangiocarcinoma†	33				
Identified at laparoscopy	14	8	4	2	0
Identified at laparotomy	19	2	2	5	10
Unresectable, gallbladder cancer*	36				
Identified at laparoscopy	21	15	6	0	0
Identified at laparotomy	15	1	2	3	9

\*  $P < .0001$  and †  $P = .002$ , Pearson chi-square, comparing etiology of unresectable disease found at laparoscopy vs. laparotomy.

**Table 3. OVERALL YIELD AND ACCURACY OF LAPAROSCOPY IN DETECTING UNRESECTABLE DISEASE**

	n	Overall Yield*	Accuracy of Detecting Unresectable Disease†
Entire group	100	35% (35/100)	51% (35/69)
Hilar cholangiocarcinoma	56	25% (14/56)	42% (14/33)
Gallbladder cancer	44	48% (21/44)	58% (21/36)

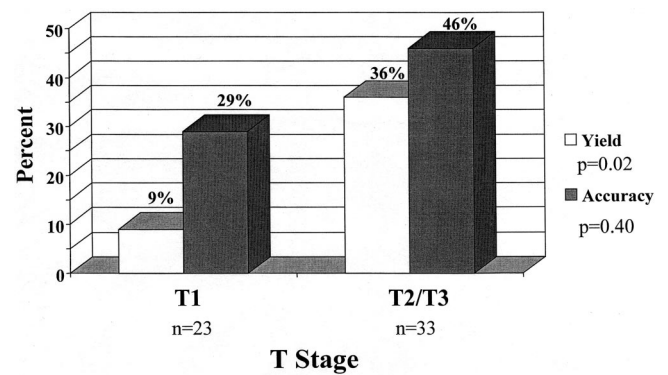
\*  $P = .02$  and †  $P = .19$ , Pearson chi-square, comparing yield and accuracy for hilar cholangiocarcinoma vs. gallbladder cancer.

was  $34 \pm 19$  minutes versus  $48 \pm 29$  minutes, respectively ( $P = .02$ ). The longer operative time for laparoscopy in patients with unresectable disease is likely due to the time required for frozen-section analysis of suspicious areas.

### Targeting Laparoscopy to High-Risk Patients

Specific subgroups of patients with hilar cholangiocarcinoma and gallbladder cancer were further analyzed in an effort to identify patients at high risk of occult unresectable disease, thereby improving the yield of laparoscopy. In patients with gallbladder cancer, the yield and the accuracy were 48% (21/44) and 58% (21/36), respectively (see Table 3). Nearly half of the patients with gallbladder cancer undergoing laparoscopy benefited from the procedure by the detection of unresectable disease, suggesting that it might be difficult to improve the yield by targeting any specific subgroup. One exception to this may be patients with an incidental finding of gallbladder cancer after cholecystectomy. In the present series, 10 of the 44 patients with gallbladder cancer had previously undergone cholecystectomy. In this group, the yield of laparoscopy was only 2 of 10 (20%), compared with patients undergoing primary resection of gallbladder cancer, in which the yield was 19 of 34 (56%,  $P = .04$ ).

In patients with hilar cholangiocarcinoma, more patients were unresectable as a result of locally advanced disease or



**Figure 3.** Yield and accuracy of laparoscopy for T1 hilar cholangiocarcinoma compared with T2 and T3 tumors.

nodal metastases than patients with gallbladder cancer (17/33 [51%] for patients with hilar cholangiocarcinoma vs. 12/36 [33%] for patients with gallbladder cancer). As shown in Table 2, metastatic disease to regional lymph nodes and unresectable locally advanced tumors were more difficult to detect with laparoscopy. Because of this, the overall yield of laparoscopy was only 25% for patients with hilar cholangiocarcinoma. Therefore, the majority (75%) of patients underwent laparoscopy without any benefit.

To target laparoscopy to patients at higher risk of unresectable disease, a revised preoperative T staging system (see Table 1)<sup>4,6</sup> was evaluated in patients undergoing laparoscopy. This staging system relies on preoperative imaging to assess the extent of tumor involvement and relies on three factors that influence resectability—biliary tumor extent, portal vein involvement, and lobar atrophy. The preoperative T staging system has been found not only to correlate with resectability but also to accurately predict the likelihood of finding occult unresectable disease.<sup>4</sup> All patients with hilar cholangiocarcinoma were staged according to this system, based on findings of preoperative imaging. When patients were stratified by T stage, the yield of laparoscopy increased from 9% (2/23) in those with T1 tumors to 36% (12/33) in those with T2/T3 tumors ( $P = .02$ ) (Table 4). There was no difference in the accuracy between T1 tumors (29% [2/7]) and T2/T3 tumors (46% [12/26],  $P = .40$ , Fig. 3). These findings suggest that rather than performing laparoscopy on all patients with hilar cholangiocarcinoma, the

**Table 4. YIELD AND ACCURACY OF LAPAROSCOPY IN PATIENTS WITH HILAR CHOLANGIOCARCINOMA ACCORDING TO T STAGE**

T Stage	n	Total Number Unresectable*	Number Unresectable at Laparoscopy	Yield of Laparoscopy†	Accuracy of Laparoscopy
1	23	7	2	2/23 (9%)	2/7 (29%)
2	29	22	11	11/29 (38%)	11/22 (50%)
3	4	4	1	1/4 (25%)	1/4 (25%)

\*  $P < .0001$ , †  $P = .02$ ,  $P = .40$  (T1 vs. T2 and T3 combined).



selective use of laparoscopy for patients with radiologic T2 and T3 tumors can increase the yield.

### Survival in Patients With Unresectable Disease

The median survival for all patients with unresectable disease was 8.6 months. In patients with unresectable disease discovered at laparoscopy, the median survival was 5.7 months compared with 15.8 months in patients with unresectable disease found at laparotomy ( $P = .009$ , log-rank). This is likely due to the differences in surgical findings precluding resection in these two groups. Nearly all the patients with unresectable disease identified at laparoscopy had peritoneal or liver metastases, whereas patients with unresectable disease at laparotomy were more likely to have locally advanced disease. This is shown by the difference in the median survival for patients with unresectable disease resulting from peritoneal disease (5.1 months), liver metastases (3.7 months), nodal disease (9.3 months), and locally advanced tumors (17.3 months) ( $P = .0008$ , log-rank).

### Complications

There were no complications directly attributable to laparoscopy. The only complication in a patient undergoing laparoscopy alone occurred in one patient with cholangitis as a result of a biliary catheter change.

### DISCUSSION

Hilar cholangiocarcinoma and gallbladder carcinoma are aggressive malignancies, with a median survival for patients with unresectable disease of 11 months<sup>3</sup> and 5 months,<sup>2</sup> respectively. Unfortunately, even after extensive preoperative evaluation, occult unresectable disease is discovered at the time of exploratory laparotomy in many patients. Because of the recovery time required after major laparotomy and the limited median survival in patients with unresectable disease, many centers have been evaluating the role of staging laparoscopy in patients with primary and secondary liver tumors.<sup>7-10</sup> The advantages of detecting unresectable disease at laparoscopy include not only the shortened recovery time and improved quality of life, but also the potentially shorter time to initiation of nonoperative therapy.

The benefit of staging laparoscopy can be analyzed first as the overall yield for the entire patient group (in which the denominator equals all patients) and second as the accuracy of detection of unresectable disease (in which the denominator includes only patients with unresectable disease). In all cases, the accuracy will be higher than the overall yield. Depending on the pattern of spread of the tumor being evaluated, the accuracy of detecting unresectable disease may be high, but the overall yield may be low. An example of this is a primary tumor type that infrequently gives rise to

peritoneal metastases, where laparoscopy would have a high accuracy of detection but a low overall yield. Thus, many patients would be evaluated with staging laparoscopy, with a benefit to only a few patients. This point is illustrated by the differences in the benefit of staging laparoscopy in patients with hilar cholangiocarcinoma and gallbladder cancer (see Tables 2 and 3). Because gallbladder cancer is more often unresectable as a result of peritoneal or liver metastases (24/36 [67%] in this series) than hilar cholangiocarcinoma (16/33 [48%]), a greater proportion of patients with these findings are correctly identified at laparoscopy. Thus, the overall yield of laparoscopy was higher for patients with gallbladder cancer.

Although the yield of laparoscopy for the entire group was relatively high (35%), the majority of patients did not benefit from the procedure. This was especially true for patients with hilar cholangiocarcinoma, in whom laparoscopy had a significantly lower yield (25%). Because of this, we attempted to identify patients at greatest risk for occult unresectable disease, and therefore more likely to benefit from laparoscopy, by analyzing the yield of laparoscopy with respect to a preoperative T staging system that assesses local tumor-related factors present on preoperative imaging (see Table 1). This staging system, previously found to predict survival, resectability, and the likelihood of metastatic disease, also correlated with the yield of laparoscopic staging.<sup>4,6</sup> There was a significant improvement in the yield of laparoscopy as the T stage increased, from 9% in patients with T1 tumors to 36% in patients with T2/T3 tumors ( $P = .02$ ). There was no significant difference in the accuracy of detecting unresectable disease: 29% in patients with T1 tumors and 46% in T2/T3 tumors ( $P = .40$ ).

In patients with gallbladder cancer, the yield of laparoscopy was highest in those not subjected to prior cholecystectomy (56% vs. 20%,  $P = .04$ ). More than half the patients with primary gallbladder cancer benefited from staging laparoscopy, supporting its routine use in this subgroup. Patients undergoing reexploration after initial cholecystectomy represent a more difficult problem. There are several issues when reexploration is performed after an incidental finding of gallbladder cancer in a cholecystectomy specimen. Because these tumors are often removed after a difficult open cholecystectomy, many of these patients will have extensive adhesions in the gallbladder bed and right upper quadrant, which makes it difficult to evaluate for residual disease with laparoscopy. Second, these patients have had recent surgical exploration in which no gross evidence of extrahepatic disease was found, although the surgeon may have been unaware of the diagnosis. Thus, because most of these patients are reexplored relatively soon after the initial operation, one would expect the yield to be low. Finally, there are almost always residual inflammatory changes from the prior procedure that are difficult to distinguish from malignancy. Therefore, these patients often undergo radical resection regardless of whether residual disease is found locally within the gallbladder fossa.

Because of this, the role of laparoscopy in patients with an incidental finding of gallbladder cancer at cholecystectomy is limited, particularly if the patient has been expeditiously referred for re-resection. In our series, only 10 patients had had a prior cholecystectomy. Of these, six were found to have unresectable disease, but only two were correctly identified with laparoscopy. Thus, the yield of laparoscopy in patients with a prior cholecystectomy was significantly lower (2/10 [20%]) than for those undergoing primary excision (19/34 [56%],  $P = .04$ ). It is difficult to generalize these results to all patients undergoing prior cholecystectomy because the number of such patients in the present series is small. However, in patients with gallbladder cancer found incidentally at cholecystectomy who are referred to specialty centers for radical resection promptly, laparoscopy likely has a limited role.

When evaluating the yield of laparoscopy in patients with malignancy, it is important to assess the adequacy of the preoperative imaging. The yield of laparoscopy is critically dependent on the quality and extent of the preoperative investigations, underscoring the importance of assessing the yield of laparoscopy in a contemporary series. In the present study, patients were imaged with a variety of techniques, but 85% underwent more than two preoperative tests, including contrast-enhanced CT scan in more than 95%, as well as MRI and ultrasound in more than 80%. As imaging technology improves, the yield of laparoscopy likely will decrease, and efforts to identify patients at greatest risk for occult unresectable disease before surgery will assume greater importance.

There are few series evaluating the use of laparoscopy in patients with gallbladder cancer. Although the yield of laparoscopy was up to 80% in some studies,<sup>11,12</sup> the patients evaluated had minimal preoperative imaging, often with ultrasound alone, and laparoscopy was used primarily as a diagnostic tool. More recent series evaluating the use of laparoscopy for patients with primary and secondary hepatic malignancies have included few patients with hilar cholangiocarcinoma or gallbladder cancer.<sup>7,9</sup> A single larger series of 31 patients with malignant proximal biliary strictures, resulting from hilar cholangiocarcinoma or gallbladder cancer, showed that 29% of the patients had unresectable disease found at laparoscopy.<sup>13</sup> These results are difficult to interpret because the extent of imaging was not evaluated. The results of the present study show that even in the setting of extensive imaging, laparoscopy plays an important role.

Laparoscopic ultrasound has been evaluated in one series and appears to have a limited role in staging hilar cholangiocarcinoma and gallbladder cancer.<sup>13</sup> In the only series in which this technique has been evaluated, 9 of 31 (29%) patients with proximal bile duct tumors had occult extrahepatic disease at laparoscopy. Only one patient with unresectable disease resulting from liver metastases was detected solely on the basis of laparoscopic ultrasound.<sup>13</sup> Our series confirms these findings: laparoscopic ultrasound did not detect any patient with unresectable disease who did not

also have unresectable disease on laparoscopic inspection. Although laparoscopic ultrasound might appear useful for identifying locally advanced lesions, particularly in assessing vascular involvement, its accuracy is often limited by inflammation secondary to biliary stents. Further, patients with extensive vascular involvement, which would be readily detected on laparoscopic ultrasound, are usually identified before surgery. Therefore, we currently use laparoscopic ultrasound only in selected patients.

The issue of palliation in patients with unresectable disease is an important one, because there is no benefit in performing laparoscopy if a surgical biliary or gastric bypass is required for palliation. Our approach to palliation is based in part on the etiology of unresectable disease, because patients with peritoneal or liver metastases appear to have a shorter median survival (<5 months in this series) than patients with locally advanced tumors (17 months). In the majority of patients with hilar cholangiocarcinoma or gallbladder cancer, palliation of jaundice and pruritus is the primary problem. In nearly all cases, jaundice can be relieved with radiologically placed stents. The patency rate for Wallstents in patients with hilar malignancies is approximately 50% at 12 months.<sup>14</sup> Because the median survival in patients with peritoneal or liver metastases is less than 5 months and the complication and death rates are significant after surgical bypass,<sup>15</sup> it is difficult to justify the added morbidity of this procedure over an interventional radiologic-placed catheter, which can be performed as an outpatient procedure. Therefore, our practice has been to treat patients with interventional radiologic techniques in the setting of extrahepatic disease (peritoneal or liver metastases) discovered at laparoscopy. In contrast to this, patients with locally advanced disease have a longer median survival, 17 months in this series. Therefore, in good-risk patients with locally advanced disease discovered at laparotomy, a surgical bypass is often preferred. Further, in many patients, unresectable locally advanced tumors are identified only after extensive dissection, often with transection of the bile duct to assess fully for portal vein invasion. Such patients clearly require reestablishment of biliary-enteric continuity once unresectability has been ascertained.

In summary, patients with hilar cholangiocarcinoma and gallbladder cancer frequently have unresectable disease that is not apparent on preoperative imaging studies. Laparoscopy correctly identifies unresectable disease and prevents unnecessary laparotomy in one third of patients. Patients with unresectable disease that is not detected at laparoscopy most often have locally advanced tumors. Patients with primary gallbladder cancer and patients with T2/T3 hilar cholangiocarcinoma should undergo staging laparoscopy before laparotomy.

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